THE EFFECT OF FOREIGN MILITARY SALES ON THE U.S. ECONOMY

Staff Working Paper

July 23, 1976

CONGRESS OF THE UNITED STATES
Congressional Budget Office
Washington, D.C.

CBO–1109

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $0.65
Stock No. 052 070 03501-9

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE **23 JUL 1976**	2. REPORT TYPE	3. DATES COVERED **00-00-1976 to 00-00-1976**

4. TITLE AND SUBTITLE **The Effect of Foreign Military Sales on the U.S. Economy**	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Congressional Budget Office,Ford House Office Building, 4th Floor ,Second and D Streets, SW ,Washington,DC,20515-6925**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**33**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

PREFACE

This paper was prepared in response to *a* request from the House Armed Services Committee for an analysis of the effect of changes in U.S. policies regarding arms sales abroad. Specifically, the paper analyzes the macroeconomic effects on the U.S. economy of the sale of U.S. arms abroad, using two econometric models. In keeping with CBO policy, it contains no recommendations.

This report was prepared by James R. Capra and Stephen H. Brooks of the Budget Analysis Division of the Congressional Budget Office. The authors would like to acknowledge the assistance of Barbara Clemmensen, Ramon Espinosa, Terry Nelson, and Robert Schafer of the Budget Analysis Division.

This paper is the second part of an analysis of U.S. foreign military sales. This first study is Budgetary Cost Savings to the Department of Defense Resulting from Foreign Military Sales, a CBO staff working paper, dated May 24, 1976.

Alice M. Rivlin
Director

CONTENTS

TABLES

CHAPTER I

INTRODUCTION AND SUMMARY

This study analyzes the macroeconomic effects on the U.S. economy of the sale of U.S. arms abroad. More specifically, it estimates the effect on domestic employment, the gross national product, price levels and other standard indices of a ban on foreign military sales. The study represents the second part of an analysis of economic and budgetary aspects of arms sales. The first part estimated the budgetary cost savings to the U.S. Department of Defense (DOD) which result from foreign military sales.[1]

The analysis reported in this paper was structured to compare projections of the U.S. economy under two alternative assumptions about the foreign military sales (FMS) program. One assumption is that of a foreign military sales program which is constant in real terms, remaining at the fiscal year 1976 level of $8.2 billion per year for fiscal year 1977 through fiscal year 1981. This means that $8.2 billion (in fiscal year 1976 dollars) in new orders would be accepted in each of these years. The program mix among weapons, services and construction is assumed to be roughly equivalent to the mix in fiscal year 1976. The second alternative assumption is that of a complete ban on new sales (orders) under the FMS program beginning with fiscal year 1977. Although new sales would be banned, all orders received prior to October 1, 1976, would be honored. The analysis in the paper focuses only on government-to-government foreign military sales; commercial sales, which were not a part of this analysis, represent a relatively small part of the total sales of U.S. arms abroad, approximately $0.6 billion in fiscal year 1976. There is no reason to expect that the economic effects of commercial sales are significantly different from those of government-to-government sales.

The results of the analysis show that by fiscal year 1981 a ban on FMS would lead to a lower current dollar GNP by approximately $20 billion. That is, if GNP were projected to be $2,500 billion in 1981, the analysis shows that a ban on FMS would result in reducing 1981 GNP to about $2,480 billion. The projected real GNP (in fiscal year 1976 dollars) would fall by $12 billion and the projected price level would be 0.2 percent lower. The analysis shows that under a ban on FMS, by fiscal year 1981 the unemployment rate would be approximately 0.3 percentage points higher than otherwise projected. Total employment would be about 350,000 jobs lower than if the FMS program were continued. Projected interest rates would be lower under a ban on FMS. Finally, by fiscal year 1981 a ban on FMS would result in a decrease in net exports (the balance of goods and services) of approximately $7.5 billion.

---

1 Budgetary Cost Savings to the Department of Defense Resulting from Foreign Military Sales, by J. R. Capra, R. E. Schafer, P. L. Renehan, Congressional Budget Office, May 24, 1976.

It should be noted that the analysis was performed under the assumption that alternative foreign or domestic sales do not take the place of foreign military sales under a ban on new FMS starting in fiscal year 1977. In addition, it was assumed that government policies are not implemented to offset the effect of a ban. Finally, it should be noted that the analysis was performed under the assumption of fixed exchange rates. Adjustments to the exchange rates as a result of a ban on FMS could reduce the effects noted above.

The report begins with a general discussion of how foreign military sales affect the U.S. economy and the two econometric models used to estimate these effects. The next chapter discusses the estimation of the values of input variables to the two models, which are in turn used to analyze the economic effects. Specifically, estimates are made of the dollar value of deliveries of goods and services and the dollar value of contract awards. The final chapter reviews the estimates derived from the two econometric models of the macroeconomic effects of foreign military sales.

CHAPTER II

HOW MILITARY SALES AFFECT THE U.S. ECONOMY

General Discussion

One aspect of the foreign military sales (FMS) program is its impact on U.S. domestic economic activity: production, employment, prices and so forth. The FMS program represents demand by foreign governments for goods produced in the U.S. and for services supplied by U.S. firms. The program is a component of total U.S. exports of goods and services.

While the goods and services supplied under this program have certain special characteristics in that they are comprised primarily of military and related goods and services, in principle their impact on economic activity is similar to that of any export. If demand for these goods increases, firms producing them will respond by increasing their output. In time this will require increasing employment. These firms will also have to increase their orders for raw materials from their suppliers. Suppliers will respond by increasing their output. These increases in output will ripple through the economy producing the standard kinds of "multiplier"[1] effects on employment, personal income, corporate profits, and so forth.

In addition to these effects of demand for U.S. goods and services, there will be some associated changes in international financial flows, with consequences for the balance of payments and exchange rates. As U.S. exports rise, the balance of payments (BOP) surplus increases. To the extent that exchange rates are allowed to adjust, however, the dollar will tend to appreciate and the BOP surplus will decrease. These "financial" effects will eventually be modified in various ways as the income multiplier begins to work. For example, rising output increases U.S. demand for imports, and also raises domestic interest rates. The former causes the BOP surplus to decline. But the latter, higher interest rates, attracts an inflow of capital from abroad with just the opposite result.

Evaluating all of these effects requires, at least in theory, a complete understanding of all of the many complex interrelationships at work in the U.S. economy and the world economy. Of course, economists are not blessed with this kind of complete knowledge. However, there are models of these interrelationships in the U.S. economy which make it possible to project on a statistical basis the effects on standard economic indices of changes in such things as U.S. exports of goods and services. The results which are reported in Chapter IV are based on experiments which were run using two of these models. The next section of this chapter describes these experiments in some detail.

---

1. Multiplier doctrine: Net investment will increase national income by a multiplied amount greater than itself. Paul A. Samuelson, Economics (McGraw-Hill, New York, 1961, 5th edition).

Analysis Of The Effects Of Foreign Military Sales Using Econometric Models

The primary accounting tool used to analyze domestic economic activity is the national income and product accounts (NIPA). In the NIPA foreign military sales are treated as exports of goods and services. They do not enter the NIPA federal budget. The reason for this is that, for all practical purposes, the federal government's role in government-to-government sales is that of an intermediary. A foreign country places an order with the United States; the U.S. Department of Defense, in turn, handles the contracting with U.S. firms -- placing the orders, scheduling deliveries and handling general administrative details.[2] The program is handled through the Foreign Military Sales Trust Fund which pays the DoD procurement accounts for the purchases and is in turn reimbursed by the foreign countries. The procurement accounts actually pay the U.S. firms. Thus, except for timing adjustments the net outlays of the FMS Trust Fund are zero and the U.S. Government is in fact simply an intermediary. Since FMS is not a part of the NIPA federal budget, changes in the FMS program will not change any component of the NIPA federal budget. Rather, changes in the program will appear as changes in exports.

Exports of goods and services under the FMS program are recorded, as are most exports, at the time of delivery. Since the direct impact on production and employment occurs before the delivery is made, analyzing the changes in exports (deliveries) alone will mask the change that will occur at the time of actual production.[3] When a contract is awarded, producers will increase their stock of the raw materials used as inputs. From the time when the raw materials are acquired until the time that the final goods are actually delivered, this activity will be recorded in the NIPA as inventory investment. The way in which CBO staff modelled changes in production activity which occur prior to delivery was to reduce inventory stocks in a way consistent with the anticipated dropoff of deliveries, using as inputs estimates of the timing and dollar value of contract awards and estimates of production lead times.

Using the data on deliveries and awards prescribed above, CBO staff made use of two computer models of the economy to measure the impact of a ban on foreign military sales starting in fiscal year 1977. The two models were those of Data Resources, Incorporated (DRI) and Wharton Econometric Forecasting Associates, Incorporated. In the case of DRI, the 1976 version of the quarterly model was used. For Wharton, the 1975 version of the annual and industry model was used. Unfortunately, at the time of this study the Wharton annual model had not been reestimated to account for the revisions to the national income and product accounts which occurred in 3anuary, 1976.

---

2. DoD Directive 5105.28 (Aug. 11, 1971; amended May 10, 1973).

3. This problem is well known and has been discussed in the context of defense purchases by K. L. Lay and K. L. 3ones, in "Economic Impact of Defense Procurement," Survey of Current Business, U.S. Department of Commerce (September, 1971).

The analysis was based on two paths for deliveries and awards. One, the baseline, assumed a continued program of new sales in fiscal years 1977-1981 at the level of the fiscal year 1976 program — $8.2 billion annually (in fiscal year 1976 dollars). The second path assumed a ban on new sales starting in fiscal year 1977 but permitted deliveries and contract awards from orders placed prior to October 1, 1976. Comparing these two paths provided the reduction in deliveries (exports) of goods and services and in contract awards that would be associated with a ban on new sales starting in fiscal year 1977. Simulating or performing experiments with the models required two corresponding changes to each model. First, inventories were adjusted in a manner consistent with both the contract award fall off and with the production lag associated with the goods that were not reordered. Second, exports of goods and services were adjusted to reflect the fall off in deliveries. No other changes were made.

There are some limitations to the use of these models in estimating the effects of changes in exports and imports. First, neither of the models project the international financial flows in any detail. They do not consider the movements in capital and international reserves that take place in response to changes in exports or imports. Therefore, while CBO can estimate the effect of an FMS ban on exports and imports of goods and services, it cannot estimate the associated capital flows. Second, the models assume that the U.S. economy is operating within a system of fixed exchange rates. The results presented in Chapter IV should be viewed as the results of an FMS ban in a world with fixed exchange rates.

The next chapter describes the derivation of the basic inputs needed in order to perform the experiments, that is, the dollar value of deliveries of goods and services and the dollar value of contract awards.

CHAPTER III

INPUTS TO MODELS USED TO ESTIMATE ECONOMIC EFFECTS OF FMS

As discussed in the previous chapter, two econometric models were used to examine the effects of foreign military sales on the economy. Neither of the models explicitly treats foreign military sales. Rather, changes in FMS enter through changes in exports of goods and services and changes in contract awards.

The purpose of this chapter is to discuss estimating procedures and estimates for the inputs to the econometric models which change as *a* result of changes in the FMS program. Because of the peculiarities of the sales program for military construction, it was necessary to make separate estimates for construction and non-construction deliveries and for construction and non-construction contract awards. The special characteristics of the military construction sales program will be discussed prior to presentation of the estimating procedures for deliveries and contract awards.

Military Construction

A unique and growing component in the foreign military sales program is military construction. Almost all sales of military construction are to Saudi Arabia under government-to-government agreements established in 1965 and 1966. The growth in this component is apparent when comparing cumulative sales of construction at the end of fiscal year 1974 with cumulative sales at the end of fiscal year 1975. At the end of fiscal year 1974 the dollar value of the cumulative sales of construction was $.004 billion, while at the end of fiscal year 1975 the figure was $4.6 billion.[1] As of January 1, 1976, cumulative construction sales were listed at $4.6 billion. More recent estimates place the total at closer to $6.5 billion. It should be noted that in the past these increases in construction sales resulting from amendments to prior years' agreements,,such as that during fiscal year 1975, did not result in these sales being recorded against the year in which the order occurred. For example, despite the fact that cumulative construction sales increased by $4.6 billion during fiscal year 1975, only about $.1 billion was recorded against fiscal year 1975 and counted as budget authority in fiscal year 1975 against the FMS trust fund total of $9.5 billion. The remaining $4.5 billion was recorded against agreements or orders made prior to fiscal year 1975.[3]

---

1. See Foreign Military Sales and Military Assistance Facts, Defense Security Assistance Agency, for 1974 and 1975.

2. Status of Foreign Military Sales, Defense Security Assistance Agency (January 6, 1976).

3. This phenomenon of identifying amendments to existing agreements as applicable to the sales orders of the year of agreement occurs in other categories of sales but to a much smaller extent.

73-381 O - 76 - 2

The mechanisms for recording construction sales obscures precisely what a constant (in real terms) foreign military sales program would be. Under a constant FMS program would all new orders for construction be charged against the current year or could new orders also be charged against prior years? The CBO staff decided that for the purposes of analysis, new orders in fiscal years 1977-1981 for both construction and non-construction categories would be charged against the year in which the order is made.

A second feature of the sale of military construction is that, although the construction program in Saudi Arabia is supervised by the U.S. Army Corps of Engineers, a significant part of the program is contracted with foreign construction firms. Construction goods purchased in foreign countries and the payment of foreign workers by foreign construction firms have, of course, virtually no effect on U.S. domestic economic activity.

The Corps of Engineers breaks the cost of military construction in Saudi Arabia into the categories of planning and design costs, Corps of Engineers costs, material costs and labor costs. Almost all planning and design is done in the United States by U.S. firms. These costs, together with Corps of Engineers costs, can in general be classified as payments by foreign countries to the U.S. for services. It appears that a large part of material costs can be classified as purchases of U.S. rather than foreign goods. First, all contracts are written to U.S. specifications with planning and design work having been done in the U.S. Secondly, a large part of the material is purchased through the Corps of Engineers under a government furnished property program. This includes most high value items, structural steel, and cement. Insofar as labor is concerned, it appears that most of the labor component of the costs pays foreign workers or, in a few instances, U.S. citizens residing in foreign countries.

Based on discussions with Corps of Engineers personnel, CBO staff estimates that approximately 65 percent of construction costs are for materials and that of this total approximately 75 percent is for the purchase of U.S. goods. The CBO staff also estimates that planning and design comprises 2 percent of total construction costs and Corps of Engineer costs are approximately 10 percent.[4] The following table contains the percentages of construction sales which, for the purposes of this study, have been apportioned to U.S. goods and services and to foreign goods and services.

4. This is the upper limit on Corps of Engineers costs, as agreed to by the Corps of Engineers and Saudi Arabia.

TABLE I

BREAKDOWN OF CONSTRUCTION COSTS

Planning and Design Costs (U.S. Services)	2%
Corps of Engineers Costs (U.S. Services)	10%
Material Costs (U.S. Goods)	50%
Labor and Material Costs (Foreign Goods and Services)	38%

Estimation of Inputs

Given the discussion of military construction, the following inputs are required to estimate the macroeconomic effects of foreign military sales:

(1) Deliveries of non-construction goods and services,
(2) Deliveries of U.S. construction goods and services,
(3) Non-construction contract awards, and
(4) Construction contract awards.

Although contracts are awarded for services, such as training and repair, it should be noted that the types of contracts that affect employment and output well before the date of delivery through the buildup of inventories are those for goods. Consequently, the input for contract awards is for goods only. These inputs need to be estimated under the two different assumptions: (a) *a* complete ban on new sales starting in fiscal year 1977 and (b) a constant $8.2 billion annual sales program (in fiscal year 1976 dollars) between fiscal year 1977 and fiscal year 1981.

Ban On New Sales

Non-Construction Deliveries. In the case of a ban on new sales, deliveries would continue through fiscal year 1981 for sales prior to the start of fiscal year 1977. In order to estimate deliveries in fiscal years 1977-1981, data on 54 major systems were analyzed. The data contained the dollar value of undelivered purchases as of January 1, 1976 for purchases that had been approved by that date plus the dollar value of purchases which were anticipated to be approved prior to the start of fiscal year 1977. The data also contained the dollar value of deliveries in fiscal years 1977-1981 for these systems. Based on this data it was possible to estimate the delivery rates (i.e., dollar value of deliveries in fiscal year 1977 dollars/value of purchases). The following delivery rates were estimated:

Delivery Rates
(Fiscal years)

1977	1978	1979	1980	1981
.23	.29	.11	.07	.07

Based on data from the Defense Security Assistance Agency (DSAA) CBO staff estimates the dollar value of undelivered purchases as of January 1, 1976 plus the dollar value of purchases between that date and October 1, 1976 to be $28.0 billion. Applying the delivery rates for the 54 systems to this total yields the following estimate of non-construction deliveries in fiscal years 1977-1981:

Non-Construction Deliveries Under
a Ban on Sales Starting in Fiscal Year 1977
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
6.4	8.1	3.1	2.0	1.9

Data from DSAA breaks out sales, deliveries and undelivered quantities by classes such as aircraft, missiles, training, supply operations, other services. Based on analysis of this data, CBO estimates that of the non-construction deliveries, 83 percent are for goods and 17 percent for services. Applying these rates to the above numbers yields:

Non-Construction Deliveries of Goods and Services
Under a Ban on Sales Starting in Fiscal Year 1977
(in billions of current dollars, fiscal years)

	1977	1978	1979	1980	1981
Non-construction deliveries (goods)	5.3	6.7	2.6	1.7	1.6
Non-construction deliveries (services)	1.1	1.4	0.5	0.3	0.3

Construction Deliveries. The estimates for construction deliveries were made on the basis of estimated work placement in Saudi Arabia[5] for the currently approved military construction program. In the construction context, work placement was taken to be synonymous with deliveries.

Using data obtained from the U.S. Army Corps of Engineers (discussed on page 8) CBO estimates the dollar value of deliveries of military construction in fiscal years 1977-1981 for projects approved by the beginning of fiscal year 1977 to be:

---

5. Almost all military construction under the FMS program is done in Saudi Arabia.

Construction Deliveries Under a Ban on
Sales Starting in Fiscal Year 1977
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
1.3	1.8	1.6	1.1	0.5

Using the percentages discussed on page 8, the dollar value of construction deliveries of U.S. goods and services is estimated to be:

Construction Deliveries of U.S. Goods and Services
Under a Ban On Sales Starting in Fiscal Year 1977
(In billions of current dollars, fiscal years)

	1977	1978	1979	1980	1981
Deliveries of U.S. construction goods	0.7	0.9	0.8	0.5	0.3
Deliveries of U.S. construction services	0.2	0.2	0.2	0.1	0.1

Non-Construction Contract Awards. If foreign military sales were discontinued starting in fiscal year 1977, some contracts would still be awarded in fiscal years 1977-1981 for sales agreements made prior to the start of fiscal year 1977. Data for the 54 systems mentioned earlier also contained estimated production lead times. Using these lead times and the scheduled deliveries, it was possible to estimate contract awards as a percentage of the dollar value of the sum of undelivered purchases as of January 1, 1976 plus anticipated purchases between January 1, and October 1, 1976. The estimated rates are:

Non-Construction Contract Award Rates
(Fiscal years)

1977	1978	1979	1980	1981
.16	.085	--	--	--

Applying these rates to the goods portion of the $28 billion in purchases discussed earlier yields the following estimates for non-construction contract awards:

Non-Construction Contract Awards
Under a Ban on Sales Starting in FY 77
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
3.7	2.0	--	--	--

Construction Contract Awards. The Corps of Engineers estimates a six month lead time between contract awards and work placement. Using this estimate and the assumption that 50 percent of construction deliveries are for U.S. goods, CBO estimates U.S. construction contract awards to be:

Construction Contract Awards Under
A Ban on Sales Starting in Fiscal Year 1977
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
0.5	0.8	0.8	0.7	0.4

A Constant FMS Program

This second case holds new sales in fiscal years 1977-1981 constant (in fiscal year 1976 dollars) at the fiscal year 1976 level of $8.2 billion. The estimated sales program was derived by first splitting sales into construction and non-construction components. For the construction component, the Corps of Engineers estimates that in fiscal year 1976 dollars the maximum work placement in Saudi Arabia is approximately $2.2 billion annually. If this level were achieved by 1977, then the difference between this program and the currently approved program would require new sales of approximately $1.0 billion per year in fiscal years 1977-1981 (in fiscal year 1976 dollars). Conversion into current dollars yields the following stream of new sales:

Construction Sales Under a Constant Sales Program
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
1.1	1.2	1.3	1.4	1.5

The non-construction sales under a program which is held constant in real terms will be approximately $7.2 billion (in fiscal year 1976 dollars). Conversion to current dollars yields the following stream of new sales:

Non-Construction Sales Under A Constant Sales Program
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
7.6	8.1	8.5	9.0	9.4

Adding the construction and non-construction sales under a sales program held constant at $8.2 billion in fiscal year 1976 dollars yields:

Total Sales Under a Constant Sales Program
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
8.7	9.3	9.8	10.4	10.9

Non-Construction Deliveries. Deliveries in fiscal years 1977-1981 under a constant sales program are the sum of deliveries from sales prior to fiscal year 1977 and deliveries from the new sales in fiscal years 1977-1981 (i.e., deliveries from orders placed in fiscal years 1977-1981). Deliveries from sales prior to fiscal year 1977 were already estimated for the case of a ban on new sales. Unfortunately, there was no data available on delivery rates from new sales for non-construction sales. Consequently, it was necessary to make assumptions about delivery rates on the basis of some very general characteristics of the relationship between sales and deliveries. The first characteristic is that, based on data on sales prior to fiscal year 1977, it appears that most sales are delivered within five years from the data of sale. Secondly, based on data for 54 major systems, the average production lead time is approximately 27 months. Since some lead times are shorter than this and since in some cases deliveries may come from U.S. stocks, it was decided that some fraction of the sales are probably delivered in the year after the sale is recorded. The following are the delivery rates which were used to estimate non-construction deliveries from new sales in fiscal years 1977-1981:

Fraction of Sales Delivered

In 1st Year	In 2nd Year	In 3rd Year	In 4th Year	In 5th Year
--	.10	.35	.35	.20

When these rates are applied to the new non-construction sales in fiscal years 1977-1981 the following stream of deliveries is the result:

Deliveries from Sales Orders
Placed After the Start of Fiscal Year 1977
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
--	0.8	3.5	6.3	8.2

Adding these deliveries to the deliveries from sales prior to fiscal year 1977 and partitioning the deliveries into goods and services yields the following estimate:

Non-Construction Deliveries of Goods and Services
Under A Constant Sales Program
(In billions of current dollars, fiscal years)

	1977	1978	1979	1980	1981
Goods	5.3	7.4	5.5	6.9	8.4
Services	1.1	1.5	1.1	1.4	1.7

The decrease in fiscal year 1979 is a result of the large decrease in deliveries from sales prior to fiscal year 1977. This dropoff is due to the fact that by fiscal year 1979 most of the sales from the large $9.5 billion sales program in fiscal year 1975 will have been delivered.

Construction Deliveries. As discussed earlier, the maximum work placement (deliveries) in Saudi Arabia is $2.2 billion per year in fiscal year 1976 dollars. For the purposes of this analysis, it was assumed that work placement (in fiscal year 1976 dollars) under a constant sales program would be $1.9 billion in fiscal year 1977, $2.1 billion in fiscal year 1978, and $2.2 billion in fiscal years 1979-1981. This yields the following schedule in current dollars:

Construction Deliveries Under A Constant Sales Program
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
2.1	2.4	2.6	2.7	2.9

The estimated deliveries of U.S. goods and services are:

Construction Deliveries Of U.S. Goods and Services
Under A Constant Sales Program
(In billions of current dollars, fiscal years)

	1977	1978	1979	1980	1981
U.S. goods	1.1	1.2	1.3	1.3	1.4
U.S. services	.3	.3	.3	.3	.3

Non-Construction Contract Awards. Non-construction contract awards under a constant sales program are the sum of contract awards from sales prior to fiscal year 1977 and contract awards from sales in fiscal years 1977-1981. Contract awards from sales prior to fiscal year 1977 were estimated for the case of a ban on new sales starting in fiscal year 1977. No data are available on the relationship between new sales (i.e., sales in fiscal years 1977-1981) and contract awards. As was the case with deliveries, it was necessary to assume contract award rates based on general characteristics of the relationship between sales and deliveries. First, since most deliveries are completed within five years from the date of sale and since producion lead times average approximately two years, then it would appear reasonable to assume that most contracts are awarded within three years of the data of the sale. Since it was earlier assumed that approximately 45 percent of a given year's sales are delivered within three years, it also appeared reasonable to assume that a significant percentage of contracts are awarded within one year of the data of sale. Given these characteristics, CBO assumed that 50 percent of the new sales of non-construction goods result in contract awards in the first year (i.e., the fiscal year of the sale), 25 percent in the second year, and 25 percent in the third year. These rates yield the following schedule of contract awards from new sales of non-construction goods under a constant FMS program:

Non-Construction Contract Awards For Orders Placed After the Start of Fiscal Year 1977
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
3.2	4.9	6.8	7.2	7.5

Adding the above contract awards to contract awards from sales prior to fiscal year 1977, yields the following estimate of total non-construction contract awards under a constant sales program:

Total Non-Construction Contract Awards Under A Constant Sales Program
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
6.9	6.9	6.8	7.2	7.5

Construction Contract Awards. Construction contract awards were estimated by assuming a six-month lead time between the awarding of *a* construction contract and the work placement. The resulting estimate of contract awards for U.S. goods is:

Contract Awards For U.S. Construction Goods
Under A Constant Sales Program
(In billions of current dollars, fiscal years)

1977	1978	1979	1980	1981
0.6	1.2	1.2	1.3	1.4

Summary of Inputs

Tables 2 and 3 contain the data inputs used for analysis of the economic impact of foreign military sales and summarize the results of the previous discussion. Table 4 contains inflation assumptions for construction and non-construction deliveries. These assumptions are based on DoD deflators for construction and non-construction outlays and roughly correspond to current best estimates of inflation. The other input, which, together with contract awards, is used to adjust inventories in the two econometric models, is production lead time. On the basis of analysis of data on 54 major systems an average production lead time of 27 months was used.

TABLE 2

CASE A: A BAN ON FUTURE SALES
(In billions of current dollars, fiscal years)

	1977	1978	1979	1980	1981
Deliveries of non-construction goods	5.3	6.7	2.6	1.7	1.6
Deliveries of non-construction services	1.1	1.4	0.5	0.3	0.3
Deliveries of U.S. construction goods	0.7	0.9	0.8	0.5	0.3
Deliveries of U.S. construction serivces	0.2	0.2	0.2	0.1	0.1
Non-construction contract awards	3.7	2.0	--	--	--
Construction Contract Awards	0.5	0.8	0.8	0.7	0.4

TABLE 3

CASE B: A CONSTANT SALES PROGRAM
(In billions of current dollars, fiscal years)

	1977	1978	1979	1980	1981
Deliveries of non-construction goods	5.3	7.4	5.5	6.9	8.4
Deliveries of non-construction services	1.1	1.5	1.1	1.4	1.7
Deliveries of U.S. construction goods	1.1	1.2	1.3	1.3	1.4
Deliveries of U.S. construction services	0.3	0.3	0.3	0.3	0.3
Non-construction contract awards	6.9	6.9	6.8	7.2	7.5
Construction Contract Awards	0.6	1.2	1.2	1.3	1.4

TABLE 4

INFLATION ASSUMPTIONS
(Average annual percent inflation)

Fiscal Years	Construction	Non-Constuction
1976 to 1977	11.6	8.6
1977 to 1978	7.6	6.1
1978 to 1979	6.5	5.3
1979 to 1980	5.8	4.3
1980 to 1981	5.7	3.9

CHAPTER IV

RESULTS OF ECONOMETRIC MODELS PROJECTIONS

This chapter presents the results obtained by comparing projections from the econometric models both with and without the changes in exports (deliveries) and contract awards which would result from a ban on FMS starting in fiscal year 1977. The changes in exports and contract awards are based on the estimates of deliveries and contract awards discussed in the previous chapter.

Overview of Results

Table 5 presents the estimated changes in projections of selected economic indices which would result from a ban on foreign military sales in fiscal year 1977 compared to maintaining a sales program of $8.2 billion in fiscal year 1976 dollars. The results show that a ban on new sales starting in fiscal year 1977 would, by 1981, lead to a decrease in the projected current dollar GNP of approximately $20 billion, a decrease in the projected real GNP of approximately $12 billion (in fiscal year 1976 dollars), and a drop in the projected price level of about 0.2 percent. In addition, a ban would increase the projected unemployment rate by approximately 0.3 percentage points, and lead to a decrease in projected employment of about 350,000 workers. Finally, a ban on FMS would result in a decrease in the projected interest rate on four-six month commercial paper and a decrease of net exports by about $7.5 billion. These estimates are, of course, predicated on the assumption that alternative sales do not replace the FMS which are banned. The estimates in Table 5 were made using both the DRI and Wharton econometric models. In general, the results from the two models are quite similar. By fiscal year 1981, both models show changes that are in the same direction and of the same general magnitude.[1] The major differences between the results of the two models are with respect to the speed at which changes occur. The estimates using the Wharton model show changes taking place much sooner than those using the DRI model.

Table 6 shows the percentage changes in the indices where appropriate. For example, the change in current dollar GNP of $19.5 billion in 1981, which was estimated using the Wharton model, represents approximately three quarters of one percent of projected current dollar GNP. The following section discusses in some detail the results presented in Tables 5 and 6.

Detailed Discussion of Results

Current Dollar GNP

The initial impact of a ban on FMS would be to lower projected current dollar GNP by approximately $1.3 billion. The estimated decrease is $20 billion by fiscal year 1981. The effect of the ban builds slowly for two reasons. First, a significant

1. The one exception is interest rates. The DRI and Wharton models have substantially different financial sectors. The responsiveness of interest rates to GNP changes is quite small in Wharton compared to DRI.

TABLE 5

EFFECT OF A BAN ON FMS STARTING IN FISCAL YEAR 1977 VERSUS
A CONSTANT SALES PROGRAM IN FISCAL YEARS 1977-1981:

Changes In Levels Of Selected Indices
(Fiscal years)

	1977	1978	1979	1980	1981
Current Dollar GNP (in billions of $)					
Wharton	-1.2	-5.7	-10.1	-14.6	-19.5
DRI	-1.4	-3.5	-9.0	-16.9	-24.1
Real GNP (in billions of FY 1976 $)					
Wharton	-1.5	-6.2	-9.7	-10.9	-12.5
DRI	-1.2	-2.5	-6.4	-10.0	-12.1
GNP Deflator (FY 1976=100)					
Wharton	+.03	+.09	+.11	—	-.11
DRI	-.01	-.04	-.08	-.23	-.42
Unemployment Rate					
Wharton	+.03	+.14	+.25	+.32	+.35
DRI	+.02	+.05	+.10	+.17	+.21
Employment (millions)					
Wharton	-.03	-.13	-.25	-.33	-.38
DRI	-.02	-.06	-.13	-.24	-.33
Personal Income (in billions of $)					
Wharton	-.6	-3.6	-6.2	-8.6	-11.9
DRI	-.9	-2.5	-6.0	-11.7	-17.6
Corporate Profits (in billions of $)					
Wharton	-.4	-.8	-2.1	-3.5	-4.3
DRI	-.3	-.7	-2.2	-4.0	-5.6
4-6 Month Commercial Paper Rate					
Wharton	--	—	-.01	-.03	-.05
DRI	-.02	-.06	-.09	-.16	-.21
Exports (in billions of $)					
Wharton	-.4	-1.2	-3.9	-7.4	-10.0
DRI	-.5	-1.5	-4.7	-9.1	-12.5
Imports (in billions of $)					
Wharton	-.3	-1.3	-2.0	-2.6	-3.0
DRI	-.1	-.5	-1.2	-2.8	-4.5
Net Exports (in billions of $)					
Wharton	-.1	+.1	-1.9	-4.8	-7.0
DRI	-.4	-1.0	-3.5	-6.3	-8.0

TABLE 6

EFFECT OF A BAN ON FMS STARTING IN FISCAL YEAR 1977
VERSUS A CONSTANT SALES PROGRAM (FISCAL YEAR 76 $) IN FISCAL YEARS 1977-1981

Percent Changes in Selected Indices
(Fiscal years)

	1977	1978	1979	1980	1981
Nominal GNP					
Wharton	-.1	-.3	-.5	-.6	-.7
DRI	-.1	-.2	-.4	-.7	-.9
Real GNP					
Wharton	-.1	-.4	-.6	-.6	-.7
DRI	-1	-.1	-.3	-.5	-.6
GNP Deflator					
Wharton	--	+.1	+.1	--	-.1
DRI	--	--	-.1	-.2	-.3
Employment					
Wharton	--	-.2	-.3	-.4	-.4
DRI	--	-.1	-.1	-.2	-.3
Personal Income					
Wharton	--	-.2	-.3	-.4	-.6
DRI	-1	-.1	-.3	-.6	-.8
Corporate Profits					
Wharton	-3	-.4	-.9	-1.4	-1.5
DRI	-2	-.4	-1.1	-1.9	-2.2
Exports					
Wharton	-.2	-.7	-1.8	-3.1	-3.7
DRI	-.3	-.7	-2.0	-3.4	-4.3
Imports					
Wharton	-.2	-.7	-1.0	-1.1	-1.1
DRI	-1	-.2	-.6	-1.1	-1.7

number of deliveries will still be made in fiscal years 1977 and 1978 from orders placed prior to the start of fiscal year 1977. Second, the multiplier effects from the FMS ban require some time to work their way through the economy.

The changes shown by the Wharton and DRI models in Tables 5 and 6 are quite similar by 1981, although the paths are somewhat different. The DRI model projects a slower reaction to the ban in fiscal years 1978 and 1979.

Real GNP

The estimated reduction in real GNP is approximately $12 billion (in fiscal year 1976 dollars) by fiscal year 1981. This is approximately seven-tenths of one percent of the projected real GNP. The initial reduction is about $1.3 billion. Again, the changes grow through fiscal year 1981 due to the time required for deliveries of orders placed prior to fiscal year 1977 and the time required for the changes in exports and contract awards to ripple through the economy.

The changes shown by the Wharton and DRI models, although similar by fiscal year 1981, follow a somewhat different path, with the DRI changes lagging behind those projected using the Wharton model.

GNP Deflator

In the short run, there is some ambiguity concerning the effect of a ban on prices. In the long run, the effect is clearly in the downward direction. By 1981 the decrease in the GNP deflator associated with a ban on FMS will be between 0.1 and 0.4 percentage points (FY 1976=100). The following discussion explains some of the factors which result in price level effects.

The reduction in the demand for U.S. goods and services, specifically military goods and services, which would result from a ban on FMS will cause firms to cut back on their output. In the short run, firms will be reluctant to lay off workers and close facilities in response to this drop in demand. Unit prices of goods will in turn tend to rise due to decreased worker productivity and excess plant capacity,[2] resulting in some upward pressure on the general price level. On the other hand, since production may respond only slowly to a fall in demand, the shortfall in demand will cause, at least initially, an undesired accumulation of inventories. In a desire to dispose of these excess inventories, firms may try to shade their prices down in order to increase sales. The DRI results indicate that the factors affecting short-run price movements more or less offset each other in fiscal years 1977 and 1978. The Wharton model, on the other hand, shows price increases through fiscal year 1979. While it is entirely possible that the productivity effects would cause slight increases in prices initially, these short-run influences are unlikely to persist for long, probably no more than 12 to 18 months. It seems unlikely that a ban on FMS would result in higher prices by 1979 as the Wharton model suggests.

---

2. See Budgetary Cost Savings to the Department of Defense Resulting from Foreign Military Sales for a discussion of these effects in defense industries.

In the longer run, firms will reduce their payrolls. Rising unemployment will lower the rate of increase in wages. Slowing the pace of wage increases must ultimately result in lowering the rate of increase in prices. These longer run effects will spread and reinforce themselves as lower rates of inflation will reduce demands for catch-up wage increases. The results from both models suggest that the price level will be lower in fiscal year 1981 under a ban on FMS than it would be if FMS were continued at an $8.2 billion (in fiscal year 1976 dollars) level.

Unemployment Rate

In the absence of new domestic sales or foreign sales of non-military goods to take the place of FMS, a ban on new foreign military sales starting in fiscal year 1977 will, lead firms to cut back on their output. These changes in output will eventually lead to increases in the projected unemployment rate. It is estimated that a ban on FMS starting in fiscal year 1977 will result in an unemployment rate that is .3 percentage points higher in fiscal year 1981 than if sales were to continue at a constant level between fiscal years 1977-81.

The DRI and Wharton results are somewhat different in magnitude. The DRI result appears to be more consistent with the change in real GNP. Again note the relatively nonlinear path of the changes over time, with the changes in fiscal years 1977 and 1978 associated with a ban on FMS being relatively small in comparison to the change in fiscal year 1981.

Employment

Another way of measuring the economic effect of a ban on FMS is to examine the effect on employment or jobs. If new sales were banned starting in fiscal year 1977, it is estimated that by 1981 there would be approximately 350,000 fewer jobs than if the FMS program were to continue at a constant level. It was not possible using the models to estimate the geographic locations or the specific industries which would be affected. Although the initial effects would be felt in industries that directly produce defense goods and services, the employment changes by fiscal year 1981 are the result of changes not only in defense industries, but in suppliers of defense industries, suppliers of their suppliers, and so forth. As a result, it would not be correct to construe the estimated employment changes as pertaining basically to one or two industries such as aerospece and shipbuilding.

As with the other indices, the effects in fiscal years 1977 and 1978 are smaller than those in fiscal years 1981. In fiscal year 1977 the projected employment would be lower by 20,000-30,000 under a ban on FMS. The smaller effects in the earlier years are due first to continuing production for orders placed prior to fiscal year 1977 and second to the reluctance of firms, at least in the short run, to reduce employment in the face of decreased demand.

Although the DRI and Wharton models demonstrate different paths of employment changes in Tables 5 and 6, both show very similar results for fiscal year 1981. The results are similar, despite the differences between unemployment rates, because the DRI model projects a larger labor force in fiscal year 1981 than does Wharton.

Personal Income and Corporate Profits

The results shown in Tables 5 and 6 are consistent with the changes in current dollar GNP and do not need further elaboration.

Interest Rates

In general, as output declines interest rates also tend to drop. The results of the analysis show that by fiscal year 1981 the 4-6 month commercial paper rate would be 0.05 to 0.2 points lower if new foreign military sales were banned starting in fiscal year 1977 than if the program continued at its current level in real terms. While the direction of the result is unambiguous, considerable uncertainty exists with respect to the magnitude. As can be seen in Table 5, the Wharton results show very little change associated with the ban in comparison with the DRI results. The DRI results appear to be more consistent with past relationships between GNP and interest rates.

Net Exports

Net exports or the balance of goods and services refers to the dollar value of exports minus the dollar value of imports. If foreign military sales were to be banned, the net exports in fiscal year 1981 would be approximately $7.5 billion lower than they would be if the program were allowed to continue at a constant level of $8.2 billion (in fiscal year 1976 dollars). As is the case with the other indices, this effect builds up slowly. In fiscal year 1977, the level of net exports under a ban is about $0.3 billion lower than under a constant program. The components of the estimates and the implications of the results are elaborated further in the following discussion.

Table 5 shows the effects of a ban on projected exports, imports, and net exports. The drop in exports is, of course, directly caused by the ban on new sales. As discussed earlier, this analysis assumes that no external or exogenous increases in exports occur to compensate for the loss in foreign sales due to the ban. Projected imports are also lower under a ban due to the lower personal income. Lower personal income means lower consumption by U.S. citizens of a whole range of goods and services, some of which include imported goods and services. On balance, net exports will be lower under a ban on FMS, since the drop in exports is greater than the drop in imports.

The effect of lower net exports on international financial flows and the balance of payments is somewhat uncertain. Unfortunately, the standard econometric models do not model the international sector in detail. It was, therefore, not possible in the context of this study to estimate the effects. In

theory, in a system in which exchange rates are allowed to move freely, exchange rate movements would balance demands for and supplies of currencies. In such a world, the effect of the FMS ban would be to weaken the dollar relative to other currencies, which would in turn induce some compensating changes in the U.S. economy. In a system of fixed exchange rates, as assumed in the models used in this paper, the reduced demand for the U.S. dollar (due to the drop in net exports) would require compensating changes in demands by central banks to offset potential movements in exchange rates. In such a system, lower net exports would give rise to an exchange in international reserves as U.S. and foreign central banks support the relative positions of their currencies.

○